

PATENT Attorney Docket No.: RIB-005

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS:

Steitz et al.

SERIAL NO.:

10/072,634

**GROUP NO.:** 

2683

FILING DATE:

February 8, 2002

**EXAMINER:** 

Not yet assigned

TITLE:

Ribosome Structure and Protein Synthesis Inhibitors

Commissioner for Patents Washington, D.C. 20231

## **INFORMATION DISCLOSURE STATEMENT**

Sir:

In accordance with the provisions of 37 C.F.R. 1.97 and 1.98, Applicants hereby make of record the patents and publications listed on the accompanying Form PTO-1449, and other information contained herein, for consideration by the Examiner in connection with the examination of the above-identified patent application. Copies of the patents and publications are enclosed.

## REMARKS

In accordance with the provisions of 37 C.F.R. 1.97, this statement is being filed (CHECK ONE):

(1)	within three (3) months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. 1.53(d), or within three (3) months of the date of entry of the national stage as set forth in 37 C.F.R. 1.491 in an international application, or before the mailing of the first Office action on the merits, or before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. 1.114; or
(2)	after the period defined in (1) but before the mailing date of a <b>final action</b> or a <b>notice of allowance</b> under 37 C.F.R. 1.311, and
	the requisite Statement is below, <b>OR</b>
	the requisite fee under 37 C.F.R. 1.17(p), namely \$180.00, is included herein, or
(3)	after the mailing date of a <b>final action</b> or <b>notice of allowance</b> but before the payment of the <b>issue fee</b> , <b>AND</b>

Information Disclosure Statement Serial No.: 10/072,634

Page 2 of 2

the requisite Statement is below, AND
the requisite petition fee under 37 C.F.R. 1.17(p), namely \$180.00 is included herein

It is respectfully requested that each of the patents and publications listed on the attached Form PTO-1449, and other information contained herein, be made of record in this application.

## **STATEMENT**

As required under 37 C.F.R. 1.97(e), Applicant(s), through the undersigned, hereby state either that [check the appropriate space only if either (2) or (3) is checked on the previous page <u>and</u> the Statement is required]:

- 1. Each item of information contained in the Information Disclosure Statement was first cited in any communication from a foreign patent office in a counterpart foreign application **not more than three months** prior to the filing of the Information Disclosure Statement; or
- 2. No item of information contained in the Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing this Statement after making reasonable inquiry, no item of information contained in the Information Disclosure Statement was known to any individual designated in 37 C.F.R. 1.56(c) more than three months prior to the filing of the Information Disclosure Statement.

Date: September 26, 2002

Reg. No.: 38,678

Tel. No.: (617) 248-7317 Fax No.: (617) 248-7100 Duncan A. Greenhalgh

Respectfully submitted,

Attorney for Applicants
Testa, Hurwitz, & Thibeault, LLP

High Street Tower 125 High Street

Boston, Massachusetts 02110

SHEET 1 OF 6

FORM PTO - 1449 ATTORNEY DOCKET NO.: RIB-005 NFORMATION DISCLOSURE STATEMENT APPLICANT(S): Steitz et al. SERIAL NO: 10/072.634 FILING DATE: February 8, 2002 GROUP: 2683 U.S. PATENT DOCUMENTS EXAM. DOCUMENT DATE NAME CLASS SUB FILING DATE IF INIT. NUMBER CLASS APPROPRIATE FOREIGN PATENT DOCUMENTS EXAM. DOCUMENT DATE COUNTRY CLASS SUB FILING ABSTRACT ENGLISH INIT. NUMBER CODE CLASS DATE ONLY LANG (Y/N) BI EP 1 172 374 A1 01/16/02 ΕP 07/13/01 Yes B2 WO 99/63937 A3 12/16/99 PCT 06/08/99 Yes **B**3 WO 01/80863 A1 11/01/01 PCT 04/27/01 Yes OTHER ART, JOURNAL ARTICLES, ETC. OTHER DOCUMENTS: (Including Author, Title, Date, Relevant Pages, Place of Publication) EXAM. INIT. C1Agalarov, S., et al., (2000) "Structure of the S15, S6, S18-rRNA Complex: Assembly of the 30S Ribosome Central Domain," Science Vol. 288, pp. 107-112 C2 Agrawal, R., et al., (1998) "Visualization of Elongation Factor G on the Escherichia coli 70S Ribosome: The Mechanism of Translocation," Proc. Natl. Acad. Sci. USA Vol. 95, pp. 6134-6138 Ban, N., et al., (2000) "The Complete Atomic Structure of the Large Ribosomal Subunit at 2.4 A Resolution," Science C3 Vol. 289, No. 5481, pp. 821-1096 Ban, N., et al., (1999) "Placement of Protein and RNA Structures into a 5 A-Resolution Map of the 50S Ribosomal C4 Subunit," Nature Vol. 400, pp. 841-847 C5 Ban, N., et al., (1998) "A 9 A Resolution X-Ray Crystallographic Map of the Large Ribosomal Subunit," Cell Vol. 93, pp. 1105-1115 Baranov, P., et al., (1998) "The Database of Ribosomal Cross Links (DRC)," Nucleic Acids Research C6 Vol. 26, No. 1, pp. 187-189 ('7 Brodersen, D., et al., (2000) "The Structural Basis for the Action of the Antibiotics Tetracycline, Pactamycin, and Hygromycin B on the 30S Ribosomal Subunit," Cell Vol. 103, pp. 1143-1154 C8Brünger, A., et al., (1998) "Crystallography & NMR System: A New Software Suite for Macromolecular Structure Determination," Acta Cryst. Vol. D54, pp. 905-921 ('9 Brünger, A., (1997) "Patterson Correlation Searches and Refinement," Methods in Enzymology, Vol. 276, pp. 558-580 C10 Carter, A., et al., (2001) "Crystal Structure of an Initiation Factor Bound to the 30S Ribosomal Subunit," Science Vol. 291, pp. 498-501

SHEET 2 OF 6

FORM PTO - 1449 ATTORNEY DOCKET NO.: RIB-005 ORMATION DISCLOSURE STATEMENT APPLICANT(S): Steitz et al.

€			
1000L			SERIAL NO.: 10/072,634
			FILING DATE: February 8, 2002 GROUP, 2683
EM!		OTHER ART, JOUR	NAL ARTICLES, ETC.
EXAM. INIT.	OTHER DOCUMENTS: (Including Author, Title, Date, Relevant Pages, Place of Publication)		
	CH	Carter, A., et al., (2000) "Functional Insights fr Antibiotics," <u>Nature</u> Vol. 407, pp. 340-348	rom the Structure of the 30S Ribosomal Subunit and It's Interactions with
	C12	Cate, J., et al., (1999) "X-Ray Crystal Structur pp. 2095-2104	res of 70S Ribosome Functional Complexes," <u>Sciençe</u> Vol. 285, No. 5,
	C13	Clemons, W. Jr., et al., (1999) "Structure of a Epp. 833-840	Bacterial 30S Ribosomal Subunit at 5.5 A Resolution," <u>Nature</u> Vol. 400,
	C14	Culver, G., et al., (1999) "Identification of an R Vol. 285, pp. 2133-2135	RNA-Protein Bridge Spanning the Ribosomal Subunit Interface," <u>Science</u>
	C15	Dahlberg, A., et al., (2001) "The Ribosome in A	Action," <u>Science</u> Vol. 292, pp. 868-869
	C16	Davies, C. et al., (1998) "Ribosomal Proteins S Synthesis and Antibiotic Resistance," <u>Journal of</u>	55 and I.6: High-Resolution Crystal Structures and Roles in Protein Molecular Biology, Vol. 279, pp. 873-888
	C17	Di Giambattista, M., et al., (1990) "Affinity La Biochemistry Vol. 29, pp. 9203-9211	beling of the Virginiamycin S. Binding Site on Bacterial Ribosome,"
	C18	Douthwaite, S., et al., (1995) "Recognition Det Biol. Vol. 73, pp. 1179-1185	terminants for Proteins and Antibiotics within 23S rRNA," Biochem. Ce
	C19	Douthwaite, S., et al., (1993) "Erythromycin Bi 23 S rRNA Peptidyl Transferase Loop," <u>Journal</u>	inding is Reduced in Ribosomes with Conformational Alterations in the Mol. Biol. Vol. 232, pp. 725-731
	C20	Douthwaite, (1992) "Functional Interactions wi Bacteriology Vol. 174, No. 4, pp. 1333-1338	thin 23S rRNA Involving the Peptidyltransferase Center," Journal of
	C21		rs of the Peptidyl Transferase Center. 1. Clindamycin as a Composite -Met and the D-Ribosyl Ring of Adenosine," <u>Bioorganic and Medicinal</u>
	C22	Gabashvili, I., et al., (2000) "Solution Structure 537-549	e of the <i>E coli</i> 70S Ribosome at 11.5 Å Resolution," <u>Cell</u> , Vol. 100, pp.
	C23	Garrett, R., et al., (1996) "The Peptidyl Transfe	erase Center," <u>Ribosomal RNA</u> pp. 327-355
	C24		f Macrolide Antibiotics on the Ribosome: New Resistance Mutation 1 rRNA," <u>Journal of Bacteriology</u> , Vol. 183, No. 23, pp. 6898-6907
	C25	Gonzales, R., et al., (2001) "Infections Due to V Lancet Vol. 357, p. 1179	Vancomycin-Resistant Enterococcus faecium Resistant to linezolid," Th
	C26	Green, R., et al., (1997) "Ribosomes and Trans	lation," Annu. Rev. Biochemistry Vol. 66, pp. 679-716

FORM PTO - 1449

INFORMATION DISCLOSURE STATEME

ATTORNEY DOCKET NO.: RIB-005

APPLICANT(S): Steitz et al.

SERIAL NO.: 10/072,634

FILING DATE: February 8, 2002 GROUP, 2683

OF IV O. A. JOURNAL ARTICLES, ETC.		
EXAM. INIT.	OTHER DOCUMENTS: (Including Author, Title, Date, Relevant Pages, Place of Publication)	
	('27	Gregory, S., et al., (1999) "Erythromycin Resistance Mutations in Ribosomal Proteins L22 and L4 Perturb the Higher Order Structure of 23 S Ribosomal RNA," J. Mol. Biol. Vol. 289, pp. 827-834
	C28	Gschwend, D. et al., (1996) "Molecular Docking Towards Drug Discovery," <u>Journal of Molecular Recognition</u> , Vol. 9, pp. 175-186
	C29	Guetell, R. (1996) "Comparative Sequence Analysis and the Structure of 16S and 23S rRNA," <u>Ribosomal RNA</u> pp. 111-128
	C30	Hansen, H.A.S., et al., (1990) "Crystals of Complexes Minicking Protein Biosynthesis are Suitable for Crystallographic Studies," <u>Biochemica et Biophysica Acta.</u> Vol. 1050, pp. 1-7
	C31	Harms, J., et al., (2001) "High Resolution Structure of the Large Ribosomal Subunit from a Mesophilic Eubacterium," Cell. Vol. 107, pp. 679-688
	C32	Harms, J., et al., (1999) "Elucidating the Medium-Resolution Structure of Ribosomal Particles: an Interplay between Electron Cryo-Microscopy and X-ray Crystallography," <u>Structure</u> Vol. 7, No. 8, pp. 931-941
	C33	Hansen, L., et al., (1999) "The Macrolide-Ketolide Antibiotic Binding Site is Formed by Structures in Domains II and V of 23S Ribosomal RNA," Molecular Microbiology, Vol. 31, No. 2, pp. 623-631
	C34	Kloss, P., et al., (1999) "Resistance Mutations in 23 S rRNA Identify the Site of Action of the Protein Synthesis Inhibitor Linezolid in the Ribosomal Peptidyl Transferase Center," J. Mol. Biol. Vol. 294, No. 1, pp. 93-101
	C35	Lázaro, E., et al., (1996) "A Sparsomycin-Resistant Mutant of Halobacterium salinarium Lacks a Modification at Nucleotide U2603 in the Peptidyl Transferase Centre of 23 S rRNA," J. Mol. Biol. Vol. 261, No. 2, pp. 231-238
***	C36	Lázaro, E., et al., (1991) "Chemical, Biochemical and Genetic Endeavors Characterizing the Interaction of Sparsomycin with the Ribosome," <u>Biochimie</u> Vol. 73, pp. 1137-1143
<del></del>	C37	Lipinski, C., et al., (1997) "Experimental and Computational Approaches to Estimate Solubility and Permeability in Drug Discovery and Development Settings," Adv. Drug Delivery Rev. Vol. 23, No. 3-25
	C38	Maskowski et al., (1987) "Single Crystals of Large Ribosomal Particles from Halobacterium marismortui Diffract to 6 A," Journal Molecular Biology Vol. 193 pp. 818-822
	C39	Matadeen, R., et al., (1999) "The Escherichia Coli Large Ribosomal Subunit at 7.5 A Resolution," Structure, Vol. 7, No., 12, pp. 1575-1583
	C40	Moazed et al., (1989) "Interaction of +RNA with 23S rRNA in the Ribosomal A, P, and E Sites," Cell Vol. 57, pp. 585-597
	C41	Moazed, D., et al., (1987) "Chloramphenicol, Erythromycin, Carbomycin and Vernamycin B Protect Overlapping Sites in the Peptidyl Transferase Region of 23S Ribosomal RNA," <u>Biochimie</u> Vol. 69, pp. 879-884

FORM PTO - 1449

ATTORNEY DOCKET NO.: RIB-005

INFORMATION DISCLOSURE STATEMENT

APPLICANT(S): Steitz et al.

SERIAL NO.: 10/072,634

FILING DATE: February 8, 2002 GROUP: 2683

<u> </u>		FILING DATE: February 8, 2002 GROUP: 2683	
ENPLY C		OTHER ART, JOURNAL ARTICLES, ETC.	
EXAM. INIT.	OTHER DOCUMENTS: (Including Author, Title, Date, Relevant Pages, Place of Publication)		
	C42	Moore, P.B. (1999) "Structural Motifs in RNA," Annu. Rev. Biochemistry Vol. 67, pp. 287-300	
	C43	Moore, P.B. (1998) "The Three-Dimensional Structure of the Ribosome and its Components," <u>Annu. Rev. Biophys.</u> Vol. 27, pp. 35-58	
	C44	Mueller, F., et al., (2000) "The 3D Arrangement of the 23 S and 5 S rRNA in the Escherichia coli 50 S Ribosomal Subunit Based on a Cryo-Electron Microscopic Reconstruction at 7.5 A Resolution," J. Mol. Biol. Vol. 298, pp. 35-59	
	C45	Mussig, J., et al., (1989) "Crystals of Wild-type, Mutated, Derivatized and Complexed 50 S Ribosomal Subunits from Bacillus stearothermophilus Suitable for X-ray Analysis," <u>J. Mol Biol.</u> Vol. 205, pp. 619-621	
	C46	Nakatogawa, H., et al., (2002) "The Ribosomal Exit Tunnel Functions as a Discriminating Gate," Cell Vol. 108, pp. 629-636	
	C47	Navaza, J., et al., (1997) "AMoRe: An Automated Molecular Replacement Program Package," Methods in Enzymology Vol. 276, pp. 581-595	
	C48	Nissen, P., et al., (2000) "The Structural Basis of Ribosome Activity in Peptide Bond Synthesis," Science Vol. 289, pp. 920-930	
	C49	Nitta, I., et al., (1998) "Reconstitution of Peptide Bond Formation with Escherichia coli 23S Ribosomal RNA Domains," Science Vol. 281, pp. 666-669	
	C50	Noller, H., (1991) "Ribosomal RNA and Translation," Ann. Rev. Biochemistry Vol. 60, pp. 191-227	
	C51	Ogle, J., et al., (2001) "Recognition of Cognate Transfer RNA by the 30S Ribosomal Subunit," Science Vol. 292, pp. 897-902	
	C'52	Pestka, S., (1974) "Antibiotics as Probes of Ribosome Structure: Binding of Chloramphenicol and Erythromycin to Polyribosomes; Effect of Other Antibiotics," <u>Antimicrobial Agents and Chemotherapy</u> Vol. 5, No. 3, pp. 255-267	
	C53	Porse, B., et al., (1999) "Ribosomal Mechanics, Antibiotics, and GTP Hydrolysis," Cell Vol. 97, pp. 423-426	
	C54	Porse, B., et al., (1999) "Sites of Interaction of Streptogramin A and B Antibiotics in the Peptidyl Transferase Loop of 2. S rRNA and the Synergism of Their Inhibitory Mechanisms," J. Mol. Biol. Vol 286, No. 2, pp. 375-387	
	C55	Ramakrishnan, V., (2002) "Ribosome Structure and the Mechanism of Translation," Cell Vol. 108, pp. 557-572	
	C56	Ramakrishnan, V., et al., (1995) "Structures of Prokaryotic Ribosomal Proteins: Implications for RNA Binding and Evolution," Biochem. Cell Biol. Vol. 73, pp. 979-986	

SEP 26

ST 16 MG

FORM PTO - 1449 ATTORNEY DOCKET NO.: RIB-005

NFORMATION DISCLOSURE STATEMENT APPLICANT(S): Steitz et al.

SERIAL NO.: 10/072,634

FILING DATE: February 8, 2002 GROUP: 2683

Abr	OTHER ART, JOURNAL ARTICLES, ETC.		
EXAM. INIT.	OTHER DOCUMENTS: (Including Author, Title, Date, Relevant Pages, Place of Publication)		
	C57	Rodriguez-Fonseca, C., et al., (1995) "Fine Structure of the Peptidyl Transferase Centre on 23 S-like rRNAs Deduced from Chemical Probing of Antibiotic-Ribosome Complexes," J. Mol. Bjol. Vol. 247, pp. 224-235	
	C58	Schlünzen, F., et al., (2001) "Structural Basis for the Interaction of Antibiotics with the Peptidyl Transferase Centre in Eubacteria," Nature Vol. 413, pp. 814-821	
	C59	Schlünzen, F., et al., (2000) "Structure of Functionally Activated Small Ribosomal Subunit at 3.3 A Resolution," Cell Vol. 102, pp. 615-623	
	C60	Schlünzen, F., et al., (1995) "A Milestone in Ribosomal Crystallography: The Construction of Preliminary Electron Density Maps at Intermediate Resolution," <u>Biochemistry Cell Biology</u> Vol. 73, pp. 739-749	
	C61	Shinabarger, D., et al., (1997) "Mechanism of Action of Oxazolidmones: Effects of Linezolid and Eperezolid on Translation Reactions," <u>Antimicrobial Agents and Chemotherapy</u> Vol. 41, No. 10, pp. 2132-2136	
	C62	Spahn, C.M.T., et al., "Throwing a Spanner in the Works: Antibiotics and the Translation Apparatus," <u>Journal of Molecular Medicine</u> ," Vol. 74, No. 8, pp. 423-439	
	C63	Swaney, S., et al., (1998) "The Oxazolidinone Linezolid Inhibits Initiation of Protein Synthesis in Bacteria," <u>Antimicrobial Agents and Chemotherapy</u> Vol. 42, No. 12, pp. 3251-3255	
	C64	Tenson, T., et al., (2002) "Regulatory Nascent Peptides in the Ribosomal Tunnel," Cell Vol. 108, pp. 591-594	
	C65	Timmermans, P., et al., (1982) "Sparsophenicol: A New Synthetic Hybrid Antibiotic Inhibiting Ribosomal Peptide Synthesis" J. Med. Chem. Vol. 25, pp. 1123-1125	
	C66	Tocilj, A., et al., (1999) "The Small Ribosomal Subunit from <i>Thermus Thermophilus</i> at 4.5 A Resolution: Pattern Fittings and the Identification of a Functional Site," <u>Proc. Natl. Acad. Sci. USA</u> Vol. 96, pp. 14252-14257	
	C67	Trakhanov, S.D., et al., (1987) "Crystallization of 70 S Ribosomes and 30 S Ribosomal Subunits from Thermus thermophilus," Febs Letters. Vol. 220, No. 2, pp. 319-322	
	C.98	Tronrud, D., (1997) "TNT Refinement Package," Macromolecular Crystallography, Part B, Methods in Enzymology Vol. 277, pp. 306-319	
	C69	Tsiodras, S., et al., (2001) "Linezolid Resistance in a Clinical Isolate of Staphylococcus Aureus," The Lancet Vol. 358, pp. 207-208	
	C70	Vannuffel et al., (1996) "Mechanism of Action of Streptogramins and Macrolides," <u>Drugs</u> Vol. 51, Suppl 1, pp. 20-30	
	C71	Vannuffel et al., (1992) "Identification of a Single Base Change in Ribosomal RNA Leading to Erythromycin Resistance," J. Biol. Chem. Vol. 267(12), pp. 8377-8382	



FORM PTO - 1449 ATTORNEY DOCKET NO.: RIB-005

INFORMATION DISCLOSURE STATEMENT APPLICANT(S): Steitz et al.

SERIAL NO.: 10/072,634

FILING DATE: February 8, 2002 GROUP: 2683

OTHER ART, JOURNAL ARTICLES, ETC			
INIT.	OTHER DOCUMENTS: (Including Author, Title, Date, Relevant Pages, Place of Publication)		
	('72	Vester et al., (2001) "Macrolide Resistance Conferred by Base Substitutions," Antimicrobial Agents and Chemotherapy Vol. 45, No. 1, pp. 1-12	
	C73	Vester et al., (1988) "The Importance of Highly Conserved Nucleotides in the Binding Region of Chloramphenicol at the Peptidyl transfer Centre of Escherichia coli 23S Ribosomal RNA," The EMBO Journal Vol. 7, No. 11, pp. 3577-3587	
	C74	Volkmann et al., (1990) "Characterization and Preliminary Crystallographic Studies on Large Ribosomal Subunits from <i>Thermus thermophilus</i> ," J. Mol. Biol. Vol. 216, pp. 239-241	
	C75	Von Bohlen (1991) "Characterization and Preliminary Attempts for Derivatization of Crystals of Large Ribosomal Subunits from <i>Haloarcula marismortui</i> Diffracting to 3 A Resolution," <u>J. Mol. Biol.</u> Vol. 222, pp. 11-15	
	C76	Welch, M., et al., (1997) "23S rRNA Similarity from Selection for Peptidyl Transferase Mimicry," <u>Biochemistry</u> Vol. 36. pp. 6614-6623	
	C77	Welch, M., et al., (1995) "An Inhibitor of Ribosomal Peptidyl Transferase Using Transition-State Analogy," <u>Biochemistry</u> Vol. 34, pp. 385-390	
	C78	Wimberly, B., et al., (2000) "Structure of the 30S Ribosomal Subunit," Nature Vol. 407, pp. 327-339	
	C79	Wittmann et al., (1982) "Crystallization of Escherichia coli Ribosomes," Febs Letters Vol. 146, No. 1, pp. 217-220	
	C80	Wool, L. et al., (1995) "Structure and Evolution of Mammalian Ribosomal Proteins," <u>Biochemistry Cell Biology</u> Vol. 73, pp. 933-947	
	C81	Xiong, L., et al., (2000) "Oxazolidinone Resistance Mutations in 23S rRNA of Escherichia coli Reveal the Central Region of Domain V as the Primary Site of Drug Action," Journal of Bacteriology Vol. 182, No. 19, pp. 5325-5331	
	C82	Yonath, A., et al., (1998) "Crystallographic Studies on the Ribosome, a Large Macromolecular Assembly Exhibiting Severe Nonisomorphism, Extreme Beam Sensitivity and No Internal Symmetry," Acta Cryst. Vol. A54, pp. 945-955	
	C'83	Yonath, A., et al., (1986) "Characterization of Single Crystals of the Large Ribosomal Particles from Bacillus stearothermophilus," J. Mol. Biol. Vol. 187, pp. 633-636	
	C84	Yusupov, G., et al., (2001) "The Path of Messenger RNA through the Ribosome," Cell Vol. 106, pp. 233-241	
	C85	Yusupov, M., et al., (2001) "Crystal Structure of the Ribosome 5.5 Å Resolution," Science Vol. 292, pp. 883-896	
	C86	Yusupov, M., et al., (1991) "Thermus thermophilus Ribosomes for Crystallographic Studies," Biochimie Vol. 73, pp. 887-897	
	C87	Zemlicka, J., et al., (1993) "Hybrids of Antibiotics Inhibiting Protein Synthesis. Synthesis and Biological Activity," <u>J. Med. Chem.</u> Vol. 36, pp. 1239-1244	
	C88	European Search Report for Application No. 01306825.9 dated May 24, 2002	
-		<u> </u>	